

ART. V.—*On the Navigation of Cape Horn*; by M. F. MAURY,  
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A variety of causes combine to render the navigation, from the Atlantic around Cape Horn to the Pacific, dangerous.

From the time Sir Francis Drake was driven off Cape Horn, till the present day, the boldest navigators have approached it with caution. They never venture in the latitude of it, until each has prepared his vessel for the rough weather to be expected in rounding it; for this, no precaution is omitted. Men of war strike part of their armament into the hold; get their anchors between decks; send up stump masts; bend the storm sails; and secure their spars with preventer rigging, as they get near the tempestuous regions. In the roughness of the passage, the crew is liable to much exposure.

There the tempest, the sea, and the iceberg assume their most terrible character, each presenting dangers almost new in their kind and peculiar to the region.

The ice, from its beds of a thousand years, is detached in islands like masses by the gale and the shock of the sea; it is swept to the north by the winds and currents, and carries in its silent course, all the dangers of the hidden rock, until it gradually melts away under the influence of more genial climates.

The gales, frequently accompanied with hail and sleet, are proverbial among seamen for their unremitting severity, and the length of their duration. Occurrences of vessels "lying to" in gales of wind, for many days, off Cape Horn, are frequent. I have seen them arrive in Valparaiso and Callao, after having been detained eighty and even one hundred and twenty days in gales and head winds off the Cape. The case of a ship's "lying to" there, in one continued gale, for seventy days, is of recent occurrence. It is not unfrequent that vessels even of war, put into the ports of Chili crippled in the rough weather at the South. The most robust constitutions overcome by long exposure to it, succumb to its severity; they may bear up against it for many days, but the hardest crew, exhausted at last by incessant toil, are forced in despair to give up the ship, clogged with ice and snow, to the mercies of the contending climates.

The waves run to a height, which, in other seas, they seldom attain. In the calm they cause no less damage than in the gale, by

distressing the ship with labor. In that succeeding a storm, vessels sometimes roll their masts away.

To determine upon the best route for doubling Cape Horn, has been a desideratum of the first importance to South Sea navigators. Many opinions have been advanced on the subject, but down to the present time, no route has been proposed, nor directions given, which have received general approbation, or have met with the concurrence of those, whose experience in Cape Horn navigation, gives value to their opinions.

The routes, which have been most recommended, and which have been followed with most success, have resolved themselves into two—the “inshore” and the “southern.” The former is preferable and more expeditious, when the winds are favorable for sailing westwardly. The latter should be taken, when gales from the westward are encountered, while doubling the Cape. By standing to the southward in such cases, the track of the violent winds, that come sweeping around the extremity of the land, from the west and northwest will be crossed; sometimes it does not reach further to the south than  $57^{\circ} 30'$  lat., it seldom extends beyond  $63^{\circ}$  south lat.

The absence of regular periodical winds in the vicinity of the Cape, contributes to the embarrassment of opinion with regard to the most expeditious route for doubling it.

No general directions can be given, which will invariably point out the best course for a vessel to steer, while passing the boisterous region. This is prevented by the uncertainty of the winds, in regard both to their strength and the direction in which they may blow. But under the guidance of certain circumstances to be pointed out, the navigator may be greatly assisted in conducting his vessel in safety through the tempestuous sea connecting the Pacific with the Atlantic.

From peculiar circumstances connected with the western gales that blow around the Cape, there is reason to believe, that they do not extend far beyond it, with equal violence, and that they are strongest in its vicinity. It is a phenomenon occurring not unfrequently under the observations of sailors, that the same gale does not always blow over extensive tracts of the ocean. Ships, a few leagues apart, are sailing sometimes at the same moment, with winds of unequal strength and even from different directions; of this a case which occurred in 1829 can be instanced; one vessel was dismasted in a gale, when another only a few leagues from her, was sailing in fine weath-

er with a moderate breeze from a different direction. This gale continued for several days nearly within the same limits.

Winds from every point of the compass are met with off Cape Horn. They blow with great violence from every quarter. The secondary causes which govern them seem to follow no laws, save those concealed in their own mysterious effects. The fact that winds with *westing*, are more prevalent than those with *easting*, in them, is established from the circumstance, that the return is less dreaded and shorter, than the outward bound passage. The ratio of winds with westing in them to those with easting is as *three to one*.

During the month of our vernal equinox they appear to assume something of the character of periodicals, prevailing from the eastward; hence March is considered the most favorable season for passing from the Atlantic around Cape Horn, into the Pacific. In November they are more prevalent from the opposite direction. This is the most favorable month for returning from the Pacific.

I have before me extracts from the logbooks of a number of vessels, that have doubled Cape Horn at different seasons of the year. Of those which have passed the Cape in March, all have had fine weather with eastwardly winds. One of them, in March, performed the passage from Bordeaux, around the Cape, to Callao, without having reefed a sail.

The recent observations of sealers, engaged in taking skins, for several years, on the South Shetland Islands, go to establish the fact, that the winds there and along the icy continent to the southward, blow from the eastward two thirds of the year, the reverse of what has long been known to be the case in the vicinity of Cape Horn.

I am informed by some masters of vessels who have been in the habit of coming to the Pacific by the southern route that by going as far south as  $63^{\circ}$ , they have not only a smoother sea, but a climate less boisterous and rigid. The fact of this comparative mildness of climate is not attested sufficiently to be admitted as a truth. It is near the region of perpetual ice. The eastwardly winds that prevail near the South Shetlands and along the icy continent, are eddies to the gales from the westward, sweeping over regions a little to the north. They are confined to certain parallels by the same peculiarity of causes, by which they are put in motion.

The icebergs common in the lat.  $63^{\circ}$  are serious objections to some, why the southern rout should never be attempted, but the probability of falling in with them, is less to be dreaded, than are the injuries

and delays incidental to the westerly gales, by attempting to ride them out in the vicinity of the Cape, where they are always most violent. The range of these gales, is frequently passed, by standing two or three degrees to the southward of St. John's.

The early navigators followed the "inshore" passage. Those who came after them, in more modern times, steered more to the south, and were sometimes favored with fair winds and speedy passages. Those who were fortunate, approved of the plan, and in the pride of success, they recommended others to pursue the same route, arguing that although the distance was greater, yet the passage was shortened, by having favorable breezes and a smooth sea. In the present day, there are those who sail by both routes, and make short passages, showing that the preference should sometimes be given to the one, and at other times, and under other circumstances, to the other.

Those who go the "inshore" passage, keep close in with the land. When the wind is fair they go to the north of Diego Ramirez; never to the south of it, further than ten or twelve leagues, if they can avoid it. Supposing this cleared, they continue on due west, upon the same parallel, as far as  $85^{\circ}$  of longitude; thence upon that meridian due north, to lat.  $40^{\circ}$  S. whence they shape their course directly for the port of destination. When the wind is favorable, they pass through the straits of Le Maire; but this should be done only when they are likely to be embayed, or when they are swept under the land so that they cannot pass to the east of Staten Land, without loss of time, and probably of a fair breeze.

A vessel may enter the straits, with a favorable breeze, and under every appearance of good weather, and in coming through, be met by a gale from the south east, which would place her on a lee shore, and in a very critical situation. The possibility of taking this gale, is a good reason why vessels should go around St. Johns, in preference to passing through the straits of Le Maire, when they are free to choose either.

If a gale from the westward, be encountered off Staten Land, they seek refuge from its violence, under the lee of the island, and "heave" or "lay to" in smooth water, until the gale abates. If they be further to the westward, before they meet it, they "lay to" on either tack, preserving the latitude in which they may be at the time of taking it, as near as practicable. After the gale has passed over, they stand again to the westward. On nearing the Cape the second time, they run the same risk of meeting an adverse gale, that they did when

it was first approached. Frequently they do not clear the Cape, until the third or fourth attempt after having been set to the eastward by gales from the westward.

During the north west gales, vessels have been driven several hundred miles to the south east. In 1819—20, an English brig was set in a north wester, from the vicinity of Hermit's Island, down to the south Shetland's, which had been discovered by a Dutchman, about two hundred years previously : during this lapse of time, their existence had never been confirmed to the world, by a concurrent report from other navigators, and the reported discovery of the Dutchman, had sunk into disbelief, and finally into oblivion. The brig, after a tedious passage, arrived at Valparaiso, and her master, (one Smith,) reported the discovery he had made to Capt. Sherif, R. N. who was in the bay of Valparaiso, in command of one of his Majesty's men of war. Capt. Sherif chartered the brig, sent officers on board, and despatched her, to ascertain the reality of the reported discovery, and the position of the Islands. They were found without any difficulty, and after sailing among them for a day or two, the brig put into a harbor, where were several American vessels, lying quietly at anchor, some of which had been in the habit for five years, of visiting that place.

When the westerly gales, become so violent as to strip the canvass from the yards, the ship is liable to much injury, if they blow for many days, which they frequently do. By persisting in the attempt to weather out the storm, and to secure the "inshore" passage, vessels have been reduced almost to the last extremity before they succeeded. In waiting to catch a favorable moment for passing the land, some are even less fortunate. After riding out gale after gale, and being driven from the land as often as they made it, they are at last, forced in distress to put back into some port on the Atlantic side. They are seen coming into Rio Janeiro or the La Plata, their hulls so completely shattered, that they scarcely keep afloat, and the crew unable to manage them, being exhausted by long exposure to the freezing winds. The delay necessarily incurred by refitting, and from the difficulty of shipping another crew, amounts to several months. Probability favors the supposition, that these misfortunes would have been avoided by lying to, on the starboard tack, and forging to the southward, out of the strength of the gale, with the expectation of catching an easterly wind in the icy regions.

Those who follow the "southern" route, take their departure from St John's, (Staten Land,) and steer to the southward to lat.  $63^{\circ}$ , where they expect to find the wind from the eastward, which will carry them as far as  $85^{\circ}$  or  $87^{\circ}$  of W. lon. They make this longitude, before they cross the parallel of  $61^{\circ}$ , whence, as those who go the other route, they steer directly north to lat.  $40^{\circ}$ .

Independently of personal observation, other means of acquiring information, relative to the navigation around Cape Horn, have been resorted to. Besides access to numerous log books and notes, information has been obtained on the subject, from masters of vessels, who have been sailing to and from the west coast of South America, for many years. The opinions of some, derived from an attentive observation, and strengthened by the experience of twenty voyages, have the highest claims to respect. The advice of these men urges the propriety of yielding to circumstances in doubling Cape Horn, and of being guided by the winds, in giving preference to either the "inshore" or the "southern" passage.

The former is to be pursued always, when the winds are favorable, keeping close into the land, never passing to the southward of Diego Ramirez, more than ten or twelve leagues. It is better to go to the northward of it, when it can be done without loss of time. The "inshore" passage being nearer in point of distance, when the winds are ahead, if the sea be smooth enough to allow a vessel to beat to windward without losing by leeway; but when this can no longer be done in a breeze that is freshening, the route should immediately be abandoned by standing to the south, until the wind shall be found to be more favorable for getting to the west, which frequently happens by running a few leagues to the southward of Diego Ramirez. The westerly winds, for the most part, come in a sweep around the land, without stretching many degrees in breadth, towards the south.

The longitude of  $85^{\circ}$  should be gained, without going to the northward of the parallel on which the land is cleared. The latitude of  $40^{\circ}$  S. as in the other route, is made on the meridian of  $85^{\circ}$ . This is always done to clear the gales and currents, which blow and set on shore in the vicinity of the Island of Mocha, and the outlet to the straits of Magellan.

Vessels bound from the U. States around Cape Horn, are recommended to cross the line, between lon.  $23^{\circ}$  and  $26^{\circ}$ , so that with the south east trades, they can fetch Cape Frio, which should always be done; then to run the coast down on soundings and to pass between the Falklands and the Main.

If driven off the coast before reaching the Islands, it is better to beat up to it, to the northward, than to pass down south, to the eastward of them, after the gale abates. There are circumstances under which the outside passage would prove the more expeditious, but their presence cannot be known by description; the situation of the vessel, the direction of the winds, the appearance of the weather, etc. are the guides for pointing out the proper time for the outside passage, and they frequently deceive seamen, who have never made a voyage around Cape Horn.

The probability of meeting westerly gales to the south, after having passed to the east of the Islands, and the sufferings to which the ship's company is liable in them, are sufficient reasons why preference should be given to the passage between the Islands and the Main. The coast and the soundings along it, are clear and regular.

When the wind is fair, Cape St. John's should be doubled close around, and all canvass crowded on the ship, to carry her to the west as fast as possible. The difficulty of the passage consists in getting from Staten Land to  $85^{\circ}$  west.

If on clearing St. John's, or making Hermit's Island, a gale be met from the westward, the vessel, unless she could clear all danger by standing to the northward and westward, should be kept constantly on the starboard tack, until she either forges out of the range of the gale, or arrives in lat.  $63^{\circ}$ . With the easterly winds to the south, she can run to  $85^{\circ}$  west, whence she can steer north to  $40^{\circ}$  as previously directed.

If it be necessary to go to  $63^{\circ}$  south, before the winds will allow the vessel to stand to the westward, she should make her westing to the southward of  $60^{\circ}$ ; if she gets out of the strength of the gale, before she reaches  $63^{\circ}$ , she can run up her westing on the parallel upon which she may be, or as near it, as the breeze will allow. It is always advisable to be in lon.  $85^{\circ}$  before attempting to pass to the northward of Cape Horn.

The U. S. S. Falmouth, and H. B. M. S. Volage, doubled Cape Horn in Oct. 1831; the latter had thirty eight the former twenty four days from the Cape to the lat. of Talcahuana. Both of them took a westerly gale off the pitch of the Cape. The Falmouth stood down on the starboard tack to  $62^{\circ} 5' S.$  and found the winds more favorable. The Volage, persisting in the attempt to gain the "in-shore" passage, lay to on either tack, to preserve her relative position with regard to the lat. of the Cape, and was drifted off to the east-

ward. When this gale abated, she stood up to the Cape again, and took another, in which she was also driven to the eastward. In the third attempt she succeeded in doubling the Cape. She put into Talcahuana, to repair the damages which she had sustained while riding out the gales from the westward. The Falmouth arrived in Valparaiso in excellent order.

In May 1829, the U. S. S. *Guerriere*, sailed around Cape Horn into the Pacific; she encountered a gale from the northward and westward, before she passed Diego Ramirez, she received it in the starboard tack, and forged to the southward: she got clear of it in lat.  $58^{\circ} 37'$  near which parallel she stood to the west, she was twenty one days from the Cape to the latitude of Talcahuana.

The U. S. S. *Brandywine*, made the same passage in seventeen days, she passed the Cape in December, 1826; she found the winds varying from N. W. to S. W.; she ran up the usual *westing* without crossing the parallel of  $57^{\circ} 30'$ . When the winds freshened so that she could not beat to windward, she lay to with her head to the south, giving the land a wider berth.

The American whale ship *Enterprise*, and the English whaler *Sussex*, encountered a gale off the Cape, near the same time. The former, by forging to the southward cleared the gale in lat.  $58^{\circ}$  and in fifteen days after first crossing the parallel of the Cape, she was in the latitude of Talcahuana. The Englishman had thirty six days to the same parallel; she lay to, close to the cape in order that when the gale should abate, she might hug the land around. Before she cleared the Cape, she was twice driven by gales off to the eastward. Short passages are made by hugging the land when the wind is fair or moderate from the westward, but seldom by waiting first to ride out a gale from that quarter. Many instances could be cited shewing the advantage of steering to the southward under such circumstances. But to prove what is here recommended is not pertinent to the object in view, reasons must suffice. Common practice teaches that good passages are more frequently made by those vessels, which finding contrary gales off the Cape, stand boldly to the south, than by those, that lie to in them, keeping near the parallel of the Cape. The barometer has not been found to be of much practical utility off Cape Horn, how useful soever it may be in middle latitudes, by indicating the approach of hurricanes; it is no index to the winds in the high latitudes to the south of Cape Horn.

He, who in the China seas, is warned by the barometer, of the approaching Typhoon, and can foretell the coming of a gale by the height of the mercury in it, finds that off Cape Horn, the same indications are frequently followed by moderate breezes and even by calms. Here the mercury, below the mean height of lower latitudes, becomes very unsteady, falling and rising several inches in a few hours. During the strength of a gale, sometimes it is observed to rise, at other times it falls or remains in statu quo. Its mean height south of the latitude of Cape Horn is 29.03 in.

As the Pacific coast of Tierra del Fuego and Patagonia is approached with the wind from the westward, the mercury in the barometer ascends. When the wind is strong, it rises above thirty inches, and close under the land with fresh westerly gales it frequently stands above 30.50 in.

From lat. 45°, embracing a region towards the south of twelve or thirteen degrees in breadth, the most prevalent winds are from the westward. Vessels entering this region from the south have a rise in the barometer, when the wind is on the land. The rise is generally observed to commence about the latitude of the Cape, continuing to increase as the land is neared; and when the winds are fresh, a greater accumulation of atmosphere is shown by a higher range of the mercury.

The result of my own barometrical observations compared with others to which I have had access, shews that within this region, the barometer stands higher when the winds are from the westward, than it does, *cæteris paribus*, between the same parallels in the Atlantic. The difference is nearly as twenty nine to thirty, and increases as the land is approached. This accumulation of atmosphere is caused from the obstruction which the mountains of Patagonia, and the highlands of Tierra del Fuego affix to the winds in their passage across the continent towards the Atlantic. The air thus obstructed is compressed by that coming after it, and according to the force of the wind, and the distance from the land, the barometer indicates a greater or less superincumbent pressure. The disturbing cause which first destroyed the atmospheric equilibrium towards the East, continuing to act, the density of the obstructed air is increased by the increased tendency to restore the equilibrium from the west. The air thus forced, rushes around the southern extremity of the land, with an impetuosity that is known only to those, who experience the effects of its violence. This current of air, as it sweeps around

Cape Horn is confined to a channel, which is widened towards the south in proportion to the latitudinal breadth of the column, that is rushing to the east. Near the southern borders of this channel, the easterly winds commence, returning in eddies towards the west whence they are again carried eastwardly, in the current that rushes around Cape Horn.

**ART. VI.**—*Plan of an Instrument for finding the true Lunar Distance*; invented by M. F. MAURY, Passed Midshipman, U. S. Navy.

G F H E, is a great circle of brass, standing upon three legs X y Z; it represents the horizon. A E, A F and B C, are arcs of great circles; they also are of brass, and their planes pass through O, a common centre.

The periphery of G F H E, the middle curvature P Q, of A E, the concave circumference of B C, and the convex of A F, have equal radii centering in O.

A E, describes half of a hemisphere on the hinge at A, the axis of which, is that of the zenith and nadir, and of course passes through O. The extremity F, of the arc A F, is fixed in the plane of G F H E, and the extremity E, of A E, revolves in the plane of G F H E, and along its circumference, describing arcs of equal circles, from the centre O, until it stands in the plane of A F, the two then represent a semicircle. By means of the screw S, which presses E to G F H E, E is placed and fixed at any distance from F. The hinge at A, is of brass turning against steel, which lessens friction.

A E and A F, are arcs of the azimuth circles, in which the sun or a star and the moon are at the time of taking a lunar observation. Each is  $90^\circ$  and graduated to every 10' or 15' on a slip of finer metal, let in for that purpose.

B C, is an arc of the geocentric circle, in the plane of which, the sun and moon appear, when the observation is taken; it is graduated as the other arcs are, but from  $20^\circ$  to  $120^\circ$ . It is intended first to set off the *apparent*, and then to measure the *true* lunar distance. To assist in transferring the altitudes and distance with exactness, from the sextants with which they are taken, to the arcs of the instrument, each of them is provided with a vernier scale, *a*, *b*, *c*, having a tangent and a fixture screw respectively attached to them. The extremity *m*, of B C, is hinged to zero of the vernier *c*; the axis of this hinge